REMARKS

In the Office Action mailed January 29, 2007, Examiner rejected claims 1-3 under 35 U.S.C. 103(a) as being unpatentable firstly over Vujasinovic in view of Zimmerman, and as being unpatentable in view of Huey also in view of Zimmerman. Claim 4 was allowed.

Examiner is directed to the fourth paragraph in claim 1 as filed. That paragraph reads as follows:

> "A central rib extending between the edges, the rib being thinner than the edges, whereby said web element exhibits a substantially dumbbell shaped cross section for efficient reinforcement of the flexible non-metallic composite body,"

Claims 2 and 3, each also independent claims, contain similar limitations.

The edges referred to in the quoted paragraph from claim 1 are the leading and trailing edges which are defined in the third paragraph of claim 1 as being the leading and trailing edges of the web element which extends between the flanges. The leading and trailing edges are further defined as having outer arcuate surfaces that are substantially semi-circular for distributing loads applied to a bond line between the inserts and the flexible non-metallic composite body during the operation of the packing element.

The combination of the cited elements in the third and fourth paragraphs of claim 1 and the corresponding paragraphs in claims 2 and 3 define a dumbbell shaped cross section which is nowhere found or suggested in the cited prior art.

The Zimmerman reference discusses the need to remove a down hole conventional sealing tool when it is no longer needed to seal the well bore, stating that, rather than de-actuate the tool and bring it to the surface of the well, the tool is typically destroyed with a rotating milling or drilling device (see paragraph 12 on page 1).

As stated in the present application, the blowout preventers in the class of devices according to the present application are subjected to repeating closing of the preventer so that the radial and vertical strain of the flexible body of the packing element in which the inserts are embedded causes fatigue and weakening of the flexible body material so that each blowout preventer packing element is normally rated as to its capability to safely sustain or withstand a certain number of closures.

Consequently, in order to increase the useful life of the blowout preventer, in one aspect of the present invention the bond or bond line between the packing element flexible body and the inserts is improved by forming the web between the upper and lower flanges of the insert as a substantially dumbbell shape when viewed in cross section through the web, that is, in a cross section extending horizontally through the web when the insert is held vertically with the upper flange above and lower flange. A new Figure 2a is enclosed for filing in the present application to illustrate the dumbbell shaped cross section along line 2a-2a in amended Figure 2. Clearly no new subject matter is introduced into this application by the introduction of Figure 2a as the dumbbell shaped cross section is repeatedly referred to throughout the disclosure as filed and is well defined so that it is clear which cross section is being referred to. Figure 2 is also amended to improve the shading to reflect the dumbbell shaped cross section of the web and so as to be consistent with the rounded leading edge illustrated in Figure 4 as filed.

As described in the application as filed, the use of a dumbbell shaped cross section provides relatively large and arcuate surface area on the leading and trailing edges of the web to reduce the stress and strains developed at the bond line between the inserts and the flexible packing element body (second paragraph on page 2). The dumbbell shaped cross section is also referred to in the application as filed as being somewhat like an I-beam in construction to provide efficient load bearing capabilities through the geometry of the insert (see fifth paragraph on page 2).

Although the last paragraph in claim 1 as filed has been deleted by way of the present amendment in response to Examiner's objection, the reference in that paragraph to increasing the volume of the flexible non-metallic composite body was a reference to the removing of some of the volume of the web of the inserts by the use of the dumbbell shape. This

is in distinction to the web used in the prior art as illustrated in Vujasinovic and Huey which does not employ any dumbbell or I-beam like shape in cross section. A new last paragraph has been added in claim 1 and in all the other independent claims. The new last paragraph point out the advantages consequent upon the use of a non-metallic insert as compared to the conventional metallic ones. In particular the new paragraph states that: "whereby, because the inserts are non-metallic, sparks are inhibited between the inserts and a drill string in a borehole in which the packing element is mounted, the need to remove the drill string from the borehole due to the packing element is reduced, and wear is reduced."

The removal of the volume from the web by changing the web design to an I-beam geometry thereby increases the volume of the flexible non-metallic composite body as it embeds the inserts and thus fills in the voids in the web. This is efficient in reducing the vertical and radial stresses and strains imposed on the resilient non-metallic composite body in that, as the gas pressure from a blowout drives the packing element vertically and the upper cone of the packing element housing (for example as indicated by reference numeral 12 in the Vujasinovic reference) drives the upper wedge shaped flanges of the inserts both vertically and radially inwardly so as to close off the annulus around the pipe (pipe 26 for example as best seen in the drawings of Vujasinovic) the flexible body material at the bond line experiences reduced stress concentrations and thus less potential for tearing and separation from the web at the bond line. Not only are stress concentrations reduced, but the dumbbell shape provides an increased surface area to further spread out the load imposed on the inserts by the forceful crushing of the packing element body upwardly and inwardly within the upper conical housing above the packing element that carries the inserts with it and allows them to effectively pivot about their lower flanges and thereby deflect inwardly to seal around the pipe. The dumbbell shape also provides bearing surfaces on the web of the insert which are better oriented than the sides of non-dumbbell shaped prior art insert webs to be in part generally more orthogonal to the load being applied to move the inserts with the movement of the packing element body. In other words, the somewhat I-beam shape of the web in cross section provides increased bearing surfaces (the flanges of the "I" shape or the rounded bulbous ends of the dumbbell shape) against which the flexible packing element body may push when assisting in actuating the inserts with the benefit of hindsight the synergy is apparent.

Notwithstanding the useful full analysis on the question of determining obviousness as set out in the factual inquiries under Graham v. John Deere Co. and summarized by the Examiner, as indicated in the recent decision of the Supreme Court in KSR International Co. v. Teleflex Inc. et al. (550 US (2007), 127 S. CT.1727 (2007)), it is still necessary to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue (see page 14 of the written decision). To facilitate review, the Court stated that this analysis should be made explicit. The Court cited In re Kahn for the statement that rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. The Court clarified that the so-called teaching, suggestion or motivation test captured a helpful insight. The Court further stated that a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. The Court also stated, on page 15, that it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does, and that this is so because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known. The Court also affirmed on page 12 of the written decision that when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be non-obvious.

In the present case, it is submitted that it is a helpful insight that there is no teaching nor suggestion in any of the cited prior art, whether taken individually or collectively, to remove the volume from the web which extends between the upper and lower flanges of the inserts in the blowout preventer packing element. With respect to whether it would have been obvious to combine Zimmerman with Vujasinovic or Huey, the discussion by Zimmerman of having to drill out rather than de-actuate a conventional packer once it has sealed a well bore indicates that Zimmerman does not consider the conventional packers and bridge plugs and the like to be re-usable. For example, Zimmerman states (page 1, paragraph 9) that given the example of a frac-plug, that rather than de-actuating the slips and bring the frac-plug to the surface of the well, the frac-plug is typically destroyed with a rotating milling or drilling device. Zimmerman also states (page 1, paragraph 12) that, like the frac-plug, conventional packers and

bridge plugs when no longer needed, must be removed from the well. Even when intended to be temporary, they must be removed to access the well bore below and rather than de-actuate the tool and bring it to the surface of the well the tool is typically destroyed with again a rotating milling or drilling device.

Consequently, a person skilled in the art following the lead of Zimmerman, would mill or drill out a packing element after it was used and following that teaching, would not then be drawn into considering how to increase the lifespan of the packing element for repeated uses of the packing element causing the aforementioned radial and vertical stresses and strains which would tend to disrupt the bond between the flexible non-metallic composite body and the non-metallic composite inserts embedded within the matrix of the flexible composite body. In fact it seems clear that one skilled in the art would be led away by the teaching of Zimmerman from modifying the webs of either Vujasinovic or Huey so as to better mate with the flexible composite body during a blowout wherein the gas pressure drives the packing element vertically within the constraints of the conical upper housing causing the resultant inward rotation of the upper wedge-shaped flanges about the pivots provided by the lower semi-cylindrical flanges supported on the actuating head (such as the actuating head 39 illustrated by Vujasinovic).

It is the elastomeric or flexible nature of the flexible non-metallic composite body in the packing element that both provides, firstly, the advantage of flowing into the open annulus around the pipe and carrying with it as it is driven upwardly on the actuating head the inserts so as to thereby drive the curved wedge-shaped upper flanges to seal over the annulus against the walls of the pipe, and, secondly, at the same time the difficulty in bonding the resilient composite body material to the web of each insert so that the packing element may be repeatedly opened and closed while still retaining the structural integrity of the bond between the resilient composite body and the inserts. If the bond is disrupted, it may be for example that the inserts may not entirely withdraw from the annular opening around the pipe leaving a partial blockage of the annulus around the pipe. That is, the resilient composite body may not fully withdraw the inserts radially outwardly relative to the pipe as the actuating head lowers with decreasing gas pressure thereby allowing the resilient composite body to return to its original shape to open the annulus and carry with it each of the inserts so as to withdraw each of the inserts to their original open position atop the actuating head.

It is for these reasons that the applicant respectfully traverses the Examiner's finding of obviousness in view of the cited art.

As stated above, again Examiner is asked to note that applicant has deleted the last paragraph of claim 1 as filed as not adding anything further to the previously defined structure. This then removes the question of ambiguity in the meaning of that last paragraph.

Applicant notes that Examiner has allowed claim 4. All of the claims, including claim 4, have been amended editorially for clarity. No new subject matter has been added. In summary, claim 4 includes not only the limitation that the web be substantially dumbbell shaped in cross section, but also includes the limitations that the web is corrugated and perforated. Consistent with the use of the dumbbell shaped cross section to improve the bond between the web and the flexible non-metallic composite body, the perforations also provide for an improved bond as the flexible non-metallic composite body is formed as a ring in which the inserts are embedded and the material of the composite body extends through the perforations (shown to be holes extending laterally through the web and also through the semi-cylindrical lower flange) thereby increasing the surface area of the bond, and so also the corrugations on the web and the lower flange also increase the surface area of the bond thereby improving the bond between the flexible non-metallic composite body and the inserts consistent with the objective of the present invention.

Applicant submits that each of the three limitations summarized above (dumbbell-shape, corrugated and perforation) and found in allowed claim 4 provide a patentable improvement as each improves the bond between the flexible non-metallic composite body and the inserts and is neither taught nor suggested in the cited prior art. Consequently, applicant has added new independent claims 5 and 6. New claims 5 and 6 are copies of amended claim 4, amended so that claim 5 only claims the improvement of the perforations in the web, and claim 6 only claims the improvement of the corrugations in the web. Applicant respectfully submits that each of these new claims 5 and 6 are, as stated above, patentable as being neither taught nor suggested in the prior art for the reasons cited above with respect to the dumbbell shaped cross section limitation.

In the Drawings

Applicant submits proposed changes to Figure 2 as shown, and new Figure 2a. A complete set of the drawings is attached as required.

In the Specification

The specification is amended editorially to correct errors on pages 2, 3, 4, 6 and 7. No new subject matter is added.

REQUEST FOR EXTENSION OF TIME UNDER 37 CFR, SECTION 1.136

Applicant hereby requests a 1 month extension of time to respond to the Office Action to and through May 29, 2007.

Examiner is respectfully requested to now pass this application to allowance.

Respectfully submitted,
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May 29/07
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